

NATIONAL AERONAUTICS AND SPACE  
ADMINISTRATION NSG-692

THE MEASUREMENT OF LUNAR AND PLANETARY  
INFRARED RADIATION  
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As of the last report the infrared photometer had been installed on the telescope and adjusted and was functional. Measurements of the radiation from Venus had been made for test purposes.

During the interim just past the rotating shutter of the photometer was broken. This shutter is a three-bladed sector cut from a glass disc and coated with an evaporated gold film. It is rotated at 12000 rpm by a small 400-cycle synchronous motor. In the original design, the glass shutter was mounted on the end of a brass rod by means of epoxy adhesive. The rod was drilled with a slightly oversize hole and was held onto the shutter shaft by six set screws, three at each end. These screws allowed a plane of the rotating shutter to be adjusted perpendicular the axis of rotation. Some heating of the rotating mirror had been noted. This amounted to only a few degrees, but could cause a spurious signal that would become important when observing objects at low temperature. Consequently the decision was made to redesign the shutter assembly so that it would be thermally insulated from the motor shaft.

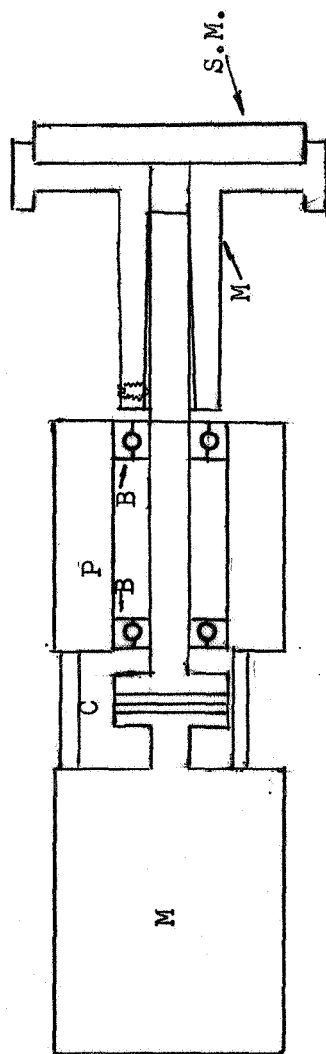
The re-designed assembly is shown in the accompanying figure. A pillow block P is attached to the motor by means of three rods. The resistor bearings B are mounted at the two ends of the pillow block, and the shutter shaft S is pressed into the bearings. The motor shaft is connected to the shutter shaft by means of a friction clutch made of thin plastic foam. The shutter mount M is turned from a single block of

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magnesium. The hole for the shutter shaft is tapered so that it fits tightly at the forward end (nearest the shutter) and loosely at the other end. Three set screws near the pillow block allow adjustment of the plane of the sector mirror. The mirror is held in the mount by epoxy adhesive. The mounting surface is machined accurately parallel to the mounting hole, and the layer of adhesive is less than 0.001" thick, so that the adjustment made by the three set screws is very small. The plane of the mirror and its plane of rotation can be made parallel within 5-10 seconds of arc. Since this is approximately equal to the angular diameter of the detector, and since the shutter reflects only the comparison beam (sky radiation), this is judged entirely adequate.

Some trouble was encountered with vibration at first. This was due principally to asymmetry in the mirror. The mirror now in use was literally machined with a diamond saw equipped with a rotating table. It was possible to hold tolerances to  $\pm .005$ " or less in this way. There is now very little vibration in the shutter.

E. Gooden



# ROTATING SHUTTER ASSEMBLY

M, motor; C, clutch; P, pillow block; B, bearings; S, shutter mount;  
S.M. Three-bladed sector mirror.